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SPATIAL AND SEASONAL PATTERNS IN THE EPIBENTHOS OF THE WESTERSCHELDE

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Introduction

The upper part of the Westerschelde estuary, called the Westerschelde, extends from Vlissingen at the mouth towards Bath at the Dutch-Belgian border, in the southwestern part of the Netherlands. Monthly beamtrawl samples were taken in 1990 at 14 stations along a salinity gradient in the subtidal of the Westerschelde with R.V. 'de Luctor' (34 m, 500 pk).

The epibenthos comprises the 0- and 1-group stages of the demersal fish species next to the larger mobile invertebrate species (mainly crustaceans). Forty-five epibenthic species were recorded, of which thirty-five species occurred with less than 1 individual per 1000 m². Different multivariate techniques were used to characterize the spatial and seasonal patterns in the epibenthos of the Westerschelde.

Based on the current knowledge, some guidelines are given for future actions that should be undertaken to improve the epibenthic situation in the Westerschelde.

Spatial patterns

A Twinspan classification analysis, based on the yearly averaged biomass values, revealed four epibenthic communities in the Westerschelde, which are divided in a marine and a brackish part around Hansweert. A CCA ordination showed the same division in the plane of the first two axes, which is mainly correlated with 3 environmental variables. The marine communities are characterized by higher salinity and oxygen saturation, while the brackish part is correlated with a higher turbidity (calculated as the reciprocal value of the Secchi depth). The latter is also twice as rich (> 2000 ind./1000m²) in epibenthos as the marine part.

Estuary, demersal fish, crustaceans

The composition of the communities for the important epibenthic categories is given in Fig. 1.

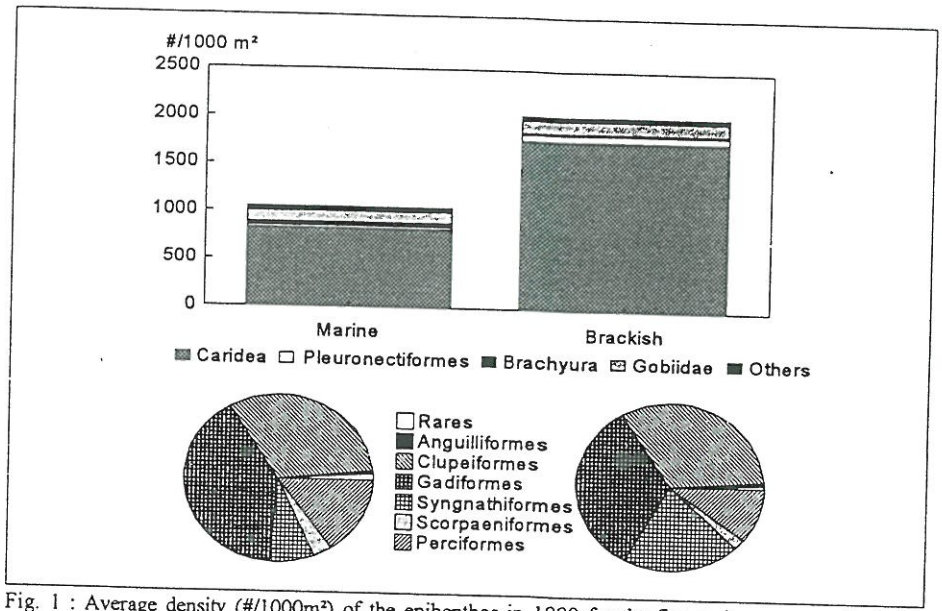

Fig. 1 : Average density (#/1000m²) of the epibenthos in 1990 for the five main groups, and relative composition for the 'others' group, in the marine and brackish parts of the Westerschelde.

Both communities are mainly dominated by shrimp *Crangon crangon*, followed by gobies *Pomatoschistus minutus* and *P. lozanoi*, flatfishes *Limanda limanda* and *Pleuronectes platessa* and shore crab *Carcinus maenas*. The other important fish groups are gadoids and clupeoids.

Seasonality

Although not very clear, correspondence analysis revealed four major temporal segregations both in the marine and the brackish part. Still, a succession from month to month can be seen, with typical species in each community (Fig. 2).

The spring and summer months are characterized by juvenile epibenthic species, such as *P. lozanoi*, bib *Trisopterus luscus* and eel *Anguilla anguilla*. The autumn and winter months on the other hand are characterized by estuarine residents, such as common goby *P. microps* and sand goby *P. minutus*, or by overwintering species, such as sprat *Sprattus sprattus*, dab *Limanda limanda*, plaice *Pleuronectes platessa* and blenny *Zoarces viviparus*.

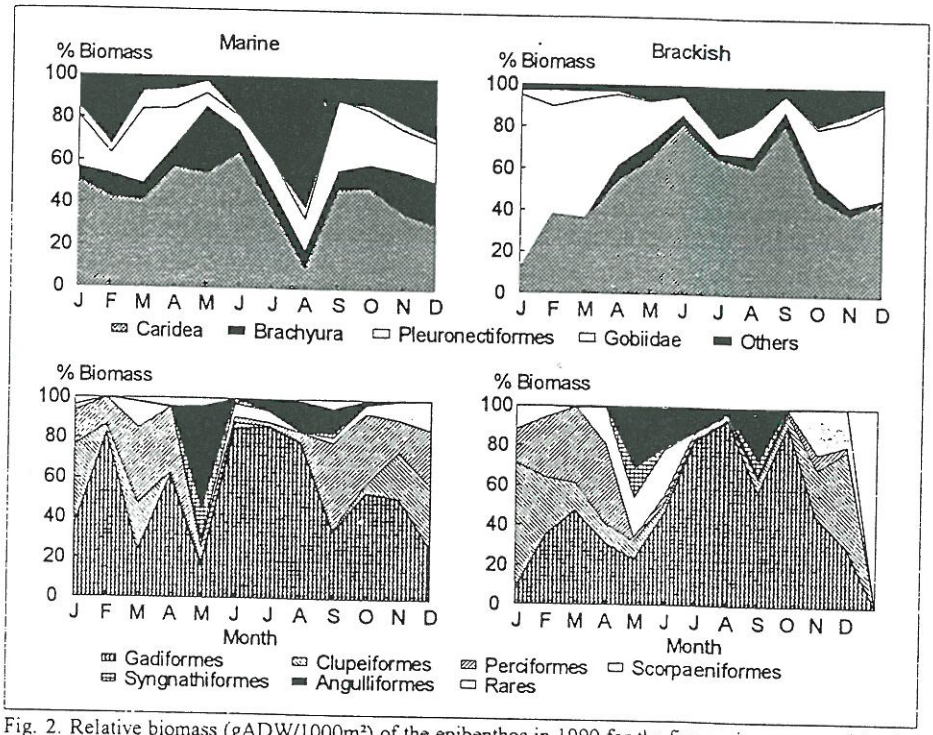

Fig. 2. Relative biomass (gADW/1000m²) of the epibenthos in 1990 for the five main groups and for the 'others' group, in the marine and brackish parts.

Human pressure

These results show that the Westerschelde still contains high numbers of some epibenthic species, but it is also characterized by an impoverished fauna. Due to high organic waste loads, the water quality upstream the Dutch-Belgian border is very bad. During most part of the year the oxygen concentrations drop below the treshold of 4 ppm, which makes it almost impossible for most marine animals to survive in that area. The number of fish species decreased with 40% in comparison with 1940. Mainly the diadromous fish species are rare or even absent from the Westerschelde.

Another important factor is the industrial pollution. It is not clear what is going to happen with the heavy metals, which are 'safely' bound to the sediment, with a sanation of the Schelde bassin. But due to high concentrations of PCB, starfish were not able to reproduce anymore, and thus have disappeared from the Westerschelde.

Also the continuous dredging in the main channel, next to sand exploitation on the sand flats and drainage of the flooding areas, resulted in a drastical change in the natural structure of the estuary, a 50% loss of marsh habitat and eroded mudflats. For the epibenthic communities in the Westerschelde, this means a reduction of their nursery and foraging habitat, which will put a damper on the importance of the Westerschelde for the North Sea fish stocks.

Conclusions

The Westerschelde can be divided into a marine and a richer brackish part. The communities still contain high numbers of some epibenthic species with a seasonal succesion from marine juveniles to overwintering species.

But the epibenthos is also characterized by an impoverished fauna, due to human pressure. Based on the current knowledge, some future actions that should be undertaken to improve the epibenthic situation, are: slow sanation of the Schelde bassin, new dredging strategies, and of course forced limitation of the overfishing of the North Sea stocks.

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